

A Work Project, presented as part of the requirements for the Award of a Masters
Degree in Management from the NOVA – School of Business and Economics.

HOW TO OPTIMIZE OPERATIONAL SHIPPING PROCESSES OF NON-
PRODUCTION MATERIALS? THE VOLKSWAGEN AUTOEUROPA CASE
STUDY

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7TH JANUARY 2013

Abstract:

In spite of not being a core issue, the shipping processes of non-production materials can be very relevant in terms of costs and inventory control. In Volkswagen Autoeuropa, that is not an exception and they take some relevance due to some problems brought about, mainly in case of shipping of materials on-consignment. In fact, this is the process in which this work project focuses more, but all are assessment aims. In that evaluation, one seeks to understand the current processes and their problems jointly with their interveners.

The solutions go through the creation of new processes, the redesign of the current ones and the introduction of Key Performance Indicators, which will/can be applied following a defined implementation plan. With the suggested solutions, one believes that is possible to have a more accurate information about the assets status and localization, to avoid non-production materials losses and decrease costs and waste of time.

Keywords: Non-production materials; Volkswagen Autoeuropa; shipping process on-consignment; shipping process with debit; shipping process without debit.

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1. Purpose of the project, scope and main research question

Purpose of the project: This work project was developed in Volkswagen Autoeuropa, a company that acts in automotive industry, while I was doing a curricular internship of six months. I worked in the Finance Controllers Office and my main tasks concerned shipping processes of non-production materials from facilities, being the project main purpose their optimization, through an efficiency increase of the current processes and the creation of new ones.

Scope: Processes about shipping of assets, expense tools and operating supplies. Now there are 4 processes: 1 – Shipping of non-production materials with debit; 2 – Shipping of non-production materials without debit; 3 – Shipping of non-production materials on-

consignment; 4 – Circulation of non-production materials between the two Volkswagen Autoeuropa facilities.

Main research question: For any company, it is very important to track its non-production materials for several reasons: if we know where the materials are we can have more accurate inventory¹ and data records, and in some cases that information is necessary to handle them (for example, in a disposal process, it is necessary to identify the asset by its number, which is known by the label stamped on it). On the other hand, it allows the assessment of non-production materials state (if they are in a “pre-disposal” state due to an inappropriate usage, or if the depreciation was faster than the expected), which influences their real and book values. Besides, in case of materials that leave the plant with an expectation of return, it is important to understand which are the possible losses for the company if those materials do not turn back. Therefore, the main research question I am going to analyze is “How to optimize operational processes round shipping non-production materials in Volkswagen Autoeuropa?”

2. Literature Review

Non-production materials are those not incorporated in the product but used to support the operations of the organizations, like the maintenance, repair and operating materials². They can be assets³, expense tools and operating supplies⁴ (these last two can be also called factory overheads, in a function perspective, or indirect material, in

¹ This inventory is a MRO (maintenance, repair and operating materials) and it takes form in the Work in Process department (for assets) and in the Non Production Materials Store (for expense tools and operating supplies).

² Sollish, Fred and Semanik John. 2012.

³ Asset is “something valuable that an entity owns, benefits from, or has use of, in generating income”, like machinery – WebFinance, Inc. 2012.

⁴ Operating supplies are “Physical items required for the running of a manufacturing production or service facility owned by a business. Operating supplies do not include salaries, but they do include consumable materials used by the business on an ongoing basis” – WebFinance, Inc. 2012.

an element perspective⁵). Looking for the Portuguese industry, a study from 2002, cited in a paper about cost structure of the Portuguese economic activities⁶ shows that in the automotive manufacturing industry, the factory overhead costs represent 21% of the total production costs, what shows the significance of these materials. Therefore, it is very important to track them and control their usage (to increase efficiency).

One of the “handling” operations they undergo is the shipping of non-production materials from the factory to other places, which can take several ways: shipping with debit, without debit or on-consignment⁷.

Looking for each process individually, the one with major probability of arising problems seems to be the shipping of non-production materials on-consignment, since the materials can be lost or damaged while they are out of the company place. To avoid those situations, it can be implemented the RFID (Radio Frequency Identification) system, as used in transportation companies (e.g. DHL⁸) or retail stores. However, a study from a software company shows that there is only 0,06% of improvement with this system (in comparison with the bar code system to identify and track materials) in terms of costs of lost or misplaced products; nevertheless, if the major part of the problems root concerns transportation, the improvements are much more substantial: 40% to 60%⁹. As a result, the RFID system can be a solution if the problems with the non-production materials tracking are significant, the investment in this system is reasonable and its implementation is feasible. If one of these circumstances does not occur, the best way to solve or minimize the problems will pass by an improvement of

⁵ Gupta, S. P., Sharma, Ajay and Ahuja, Satish. 2007.

⁶ Gomes, Conceição and Rodrigues, Lúcia. 2004.

⁷ Consignment happens when something is placed in the hand of other entity but its ownership does not change, being its owners the same. In this case, the shipment on-consignment takes place when someone else is responsible for the materials until they are back, being this condition the most important: the materials have to turn back, without associated cash-flows.

⁸ IBM. 2012.

⁹ FicusSoft. 2004.

the current processes and the possible creation of new taking into account the risks of a more “traditional” and less sophisticated approach, arisen because “human quality exerts tremendous impact on the thought processes, attitudes, behavior patterns, and actions of people”¹⁰, and consequently in their performance.

3. Objectives and methodology:

Objectives: Taking into account the shipping processes are very important to control which materials leave the facilities, the reason for it and in which mode it is done (if it should generate cash-flow or not), it is crucial that one uses the right process and it is possible to track the materials, namely for accounting record (in order to inventories be updated), the materials do not disappear and to assure the company is not harmed financially. Therefore, the objectives of this work project are:

- a) To reduce the shipping of non-production materials on-consignment longer than one year in 95% – the materials should be outside the company on-consignment for one year in maximum, after it, the consignment has to be renewed, otherwise the consignment generates a tax payment¹¹.
- b) To create a process for shipping of expense tools and operating supplies to perform jobs outside the factory – whenever an employee needs to fix a car that already left the factory, he has to use the shipment of materials on-consignment process, what is not feasible because it takes time, resources and it can take money in some cases due to the consequences of the delay that causes;

¹⁰ Adjibolosoo. 2001

¹¹ Legally, the consignment contract is essentially characterized by the delivery of movable property by the consignor to the consignee in order to this last one sell it, being his obligation to pay it to the consignor or to give it back, if the consignee cannot sell the property and does not want to keep it. – Instituto das Tecnologias de Informação na Justiça. 2010. On the other hand, if the payment is not done in one year after the delivery of the property to the consignee, it is necessary to pay the VAT (Value Added Tax) associated to the sale value. – Direcção Geral dos Impostos. 2008.

- c) To create a process for assets and/or expense tools circulation between the two Volkswagen Autoeuropa facilities that neither require an investment project¹² nor be covered by the 4th mentioned process – there is no specific process for this case, so whenever it happens, the used process is the shipping of materials on-consignment, even if it lasts several years, which also decreases the accuracy of the inventory records;
- d) To improve the shipping process of non-production materials on-consignment in case of outsourcing – as that consignment takes several years, it has to be renewed every year, which cannot be changed due to an auditing rule, regarding the external confirmation procedure¹³.

In common to these objectives, it is also desired that all process interveners respect some determinants of quality service, namely responsiveness (readiness to perform an activity, in due time), competence (having the required skills and knowledge to perform the process activities) and communication (in this case, among the interveners)¹⁴.

Methodology: To develop this project, the first step passes through doing a literature review to understand the impact and importance of handling non-production materials, and consequently the importance of their shipping. Besides, it is important to realize the possible problems and try to figure out the possible solutions. Those problems will be confirmed or not, in this company, in the As Is status analysis regarding each process. It consists of understanding each step, each intervener, problems identified by them, the documents used and the current Key Performance Indicators (KPI's).

¹² When there are materials that goes to the small Volkswagen Autoeuropa plant under an investment project, their location change is approved and documented on it and there is an update of the accounting files “in due time”.

¹³ That procedure is an auditing proof collected by the auditor to a third entity, who confirms the data in cause. – Conselho Nacional de Supervisão de Auditoria. 2010. In this case, the data to be confirmed is the presence of the assets that belong to Volkswagen Autoeuropa in the outsourcing supplier facilities and it has to be done yearly.

¹⁴ Janakiraman B. and Gopal R. K. 2006.

The second stage is based in a deep analysis of the problems of each process through: interviews to its interveners; analysis of some files that report delays in the delivery of some material (in case of shipping on-consignment) and that record some activities; and discussions with the Finance Controllers Office about the implications/consequences of the problems.

Afterward, some solutions are proposed after an analysis of their feasibility and impact. Finally, I design a process implementation plan for the proposed changes (in processes and KPI's), promoting their continuous improvement.

4. Analysis of the actual processes and opportunities for improvement (As Is status)

Company macro process: Volkswagen Autoeuropa is a company whose core business is the production of cars (nowadays, it produces Volkswagen Sharan, Volkswagen Eos, Volkswagen Scirocco and Seat Alhambra), which happens in its main plant. Besides, there are two different business units running: one produces body pieces for other Volkswagen Group models and brands (like Volkswagen Golf, Porsche Carrera or Audi A4), in the main plant as well; the other produces the tools that will stamp the steel platine for other car models, in other Volkswagen Group factories, which takes place in a second plant, outside the main one perimeter.

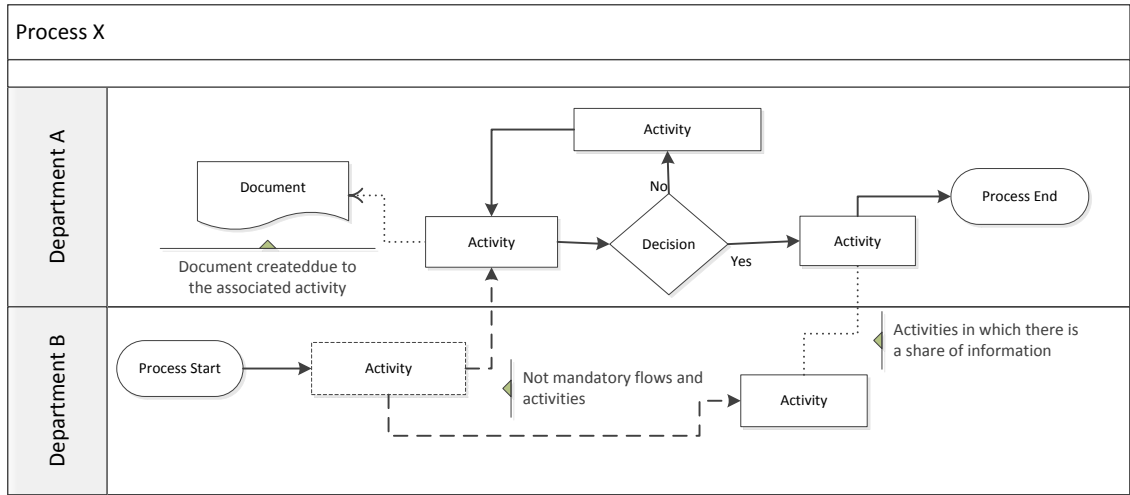
To run these processes, it is necessary to run support processes like shipping of non-production materials, which will be the focus of this work project.

Current shipping processes: As already mentioned, nowadays, there are 4 processes: the shipping of non-production materials with debit refers to an exit of material that can occur through a sale (of an obsolete machinery to a scrap dealer, for instance) or a

devolution of material when there is a mistake made by the supplier and it is already paid; the shipping of non-production materials without debit refers to an exit of material that does not generate a cash-flow (e.g. offer of an obsolete machinery to a professional school); the shipping of non-production materials on-consignment: it refers to an exit of material that will turn back (it is the expected), which means that there are no cash flows (e.g. repair of machinery); the circulation of non-production materials between the two Volkswagen Autoeuropa facilities – it was created because Volkswagen Autoeuropa has two facilities and each one has one plant perimeter and its main gate, which implies a control of materials that leave a facility and arrive to the other, thus, this process refers to an “automatic allowance” to pass some specific material (operating supplies and some expense tools) between both plants (it is not necessary an approval by an Area Production manager every time it is necessary to circulate materials).

Processes mapping: To understand a process, it is useful to map its activities and flows to realize their interactions and relevance. Therefore, to know how to read a process map, figure 1 shows a map with the legend of the used shapes and some notations.

Figure 1 – Process map legend



As mentioned before, there are four processes shipping of non-production materials, but in reality one can say there are more than four (specializations¹⁵) due to some differences regarding the shipping circumstances, the initiatives from who is in charge of the shipment and the specificities of the materials. Thus, the shipping of non-production materials with debit can occur due to a sale (see Appendix A¹⁶) or due to devolution of materials already paid (see Appendix B). In this last case, if the anomaly in the material is detected in the Non Production Materials (NPM) Store, all the activities that are performed in the Production Area (according to the process map) become to be performed in the NPM Store.

The shipping of non-production materials without debit process run, in general, through the Production Area, the Finance Controllers Office (nowadays, this is the only shipping process with the intervention of this department), the NPM Store, the Security Gate (such as happens with all shipping processes) and the Accounting Department (see Appendix C). Nevertheless, depending on the volume and weight of the material or the Production Area preference/initiative, there can be a little difference: the material does not pass through the NPM Store and it is picked up directly from the Production Area by the transporter.

The shipping of non-production materials on-consignment can take two ways: when there is machinery to be repaired (see Appendix D) and when there are other materials that need to leave the factory for other motives (see Appendix E). However, in the first way, there is other variant: the Production Area can have the initiative to ask quotations for the machinery repair and, in that case, the machinery can wait for transporter picks it

¹⁵ According to MIT Process Compass, each process can be viewed under four dimensions, being the generalization and the specialization of a process two of them – Ardagna, Danilo, Mecella, Massimo and Yang, Jian (edited by). 2009.

¹⁶ The appendices sorted by letters are in the work project supplement: Complementary Appendices.

up in the Production Area or in the Work Preparation Department. Concerning the shipping of non-production materials on-consignment (other materials), they can be picked up from the Production Area or from the NPM Store, as happens in the shipping of non-production materials without debit process, and their reception (when materials turn back) is done by the NPM Store or by the Production Area according to where the transporter/employee picked it up.

Regarding the circulation of non-production materials between the two Volkswagen Autoeuropa plants, that process does not varies and it runs always in the same way (see Appendix F).

About the process interveners, all tasks can be done by any employee from the department or area in cause except the approvals of the Request for Shipment: the first, that happens in the Production Area, can only be done by a manager; the second is done by a finance controller. In the shipping of non-production materials on-consignment, when the material/machinery turns back to the plant, who verifies its conditions and sign the Request for Shipment confirming its return is who requested the shipment.

Documents used in the processes: In every process (among the first 3 mentioned), it is used a Request for Shipment (see Appendix G) and a Shipping Document (see Appendix H). The first is an internal document and the second one is an external, with 5 copies besides the original (original/1: it follows the material; 2: it is “gleaned” in the main gate and it is delivered to Accounting Department; 6: it remains in the Non Production Materials Store – the department from where the material is shipped –; 3, 4 and 5: they can be used/delivered to the Police in case of scrutiny, to the transporter company and to the receiver). These documents ask the same data about the materials description; however, the first one requires more information about the person who

requested the shipment, the expected date of return (shipping on-consignment), and the shipment motive (shipping on-consignment and without debit); the second requires more information about the transportation.

In the shipping of non-production materials with debit, the process ends with one of two documents: the debit note (in case of devolution of material already paid) or the invoice (in case of sale – see Appendix I).

In relation to the circulation of materials between the two Volkswagen Autoeuropa facilities, there is a specific document that follows the materials: the list of materials that can circulate between the facilities without any particular authorization or approval (see Appendix J).

Processes control methods: The current processes do not include KPI's to measure their effectiveness and the only ways of processes control are: a regular audit to the emitted Requests for Shipment and Shipping Documents done by the internal finance controller; a weekly status update of the materials that were shipped on-consignment and did not turn back until the expected date of return sent to Finance Controllers Office and to people in charge of the shipments on-consignment, in order to they regularize the situation; and as some tasks are developed in SAP, there are some errors that are detected by the software and obligate the input data to be according to the established.

Opportunities for improvement: Actually, there are several problems with the shipping processes¹⁷. The most effective is the shipping of non-production materials with debit and the least effective is the shipping of non-production materials on-consignment. This last fact happens for two main reasons: it is the only process that does not imply

¹⁷ See Objectives, page 5.

approval by the finance controllers and as shipping processes are too broad, people have a tendency to opt by this one, since it has less control (it is always preferable avoid a “sieve” that can prevent the process from going further¹⁸) instead of the shipping of non-production materials without debit, even if the materials do not turn back to the company; and it is seen as a process used when the others are not applicable and not for a specific set of situations.

On the other hand, there are several circumstances that are not covered by the current processes, namely: when there are assets and/or expense tools that circulate between the two Volkswagen Autoeuropa facilities that neither require an investment project nor be covered by the 4th mentioned process; and when there are expense tools and operating supplies that are used by employees outside the facilities (in case of problems occurred during the manufactured cars transportation).

As result, there are several opportunities for improvement that will be exploited, namely the creation of new processes and the introduction of KPI's, which is preferable to the implementation of a RFID system¹⁹ taking into account its costs (software and hardware implementation, maintenance and training), its implementation feasibility (there are thousands of assets and assets components – not only in Volkswagen Autoeuropa, but also in other companies for outsourcing – and an uncountable number of expense tools and operating supplies; and these last have a very short lifetime).

Main problem analysis: As the most problematic process is the shipping of non-production materials on-consignment, it is useful to analyze the impact of its incorrect usage. Thus, if we review the list of non-production materials that left the main plant

¹⁸ That behavior can be explained by the Postulate IV of the Resourceful, Evaluative, Maximizing Model: “Human beings are not only capable of learning about new opportunities, they also engage in resourceful, creative activities that expand their opportunities in various ways.” – Jensen, Michael C. 2001.

¹⁹ See Literature Review, page 4.

on-consignment and did not turn back in the expected date of return, we conclude there were 141 shipments to the small Volkswagen Autoeuropa plant since 2005, whose value, in the shipping date, was around 290.000€. Of these materials, several or lots of them may not exist anymore, but the records of their existence and the expectation of their return are still opened, and there are assets whose Request for Shipment have not their asset number, which can be problematic in case of a disposal process.

If we analyze the list of materials that left the main plant to other companies or with employees and are in delay in relation to the expected date of return, their value totalized (in the first week of October 2012) more than 6,6 millions of Euros. From these consignments, the ones caused by repairs, tests and maintenance of materials were 20,32% and the ones due to outsourcing were 72,05% (in value, not in number of shipments). As a result, around 4,7 millions of Euros in assets are “polluting” this consignments status list during years and as their localization records are not updated, to know their current localization is a very time-consuming task.

5. Discussion of solutions for the founded problems of each process (To Be)

Suggested solutions by problem:

- a) Shipping of non-production materials on-consignment (other situations that not a machinery repair) that should be shipped through the shipping of materials without debit process, if it was approved: the only way to avoid this problem is to introduce the approval of the Request for Shipment by a finance controller in the process, after the approval by an Area Production manager and before the emission of the Shipping Document (see Appendix 1²⁰). However, that is feasible only if there are other processes that narrow the set of circumstances in

²⁰ The appendices sorted by numbers are in the end of the work project, since page 24.

which this process is applicable, in order to decrease the number of shipments on-consignment.

- b) Shipping of assets for other companies in an outsourcing context: nowadays, the used shipping process is the shipping of non-production materials on-consignment (other materials), being the consignments duration one year²¹. As usually the assets do not return in one year, these consignments appear in the list of materials that did not return in the expected date of return²² after that year (until its renewal) and, in that time, the Finance Controllers Office ask to the Accounting Department do the update of the assets localization in the SAP system and of the inventory regarding the assets that belong to Volkswagen Autoeuropa and are in other companies facilities for the purpose of external confirmation procedure²³. In order to avoid the notification done by the NPM Store through the list of consignments with expired date of return, whenever a consignment is motivated by outsourcing, the (original) Shipping Document should go to the Accounting Department instead of remaining in the NPM Store and the updates should be done on time, and not one year after.
- c) Circulation of assets and/or expense tools between the two Volkswagen Autoeuropa facilities that neither require an investment project nor be covered by the 4th mentioned process: this process (as the 4th As Is process) is necessary just because there are two security gates and two facilities in different places, with two different perimeters, since the assets and/or expense tools remain belonging to the same company. On the other hand, there is a Just in Time

²¹ See footnote 11, page 5.

²² See Processes control methods, page 11.

²³ See footnote 13, page 6.

(JIT)²⁴ corridor between Volkswagen Autoeuropa and some facilities in the industrial park, including the other Volkswagen Autoeuropa plant, which is not “public”, which means that it is possible to circulate there without a Shipping Document. Therefore, the only document used in this process will be a Request for Shipment, to keep it as simple as possible. The Production Area will be responsible for the emission of the document and for the delivery of one copy to the Security Gate that will use it, in turn, to check out the materials that will leave the plant in cause. If materials can be shipped, the copy of the Request for Shipment is signed to attest the materials that leave the plant are the ones with effective authorization to that and it is delivered to the Production Area, to this one compare it with the arrived materials to the other plant (see Appendix 2).

- d) Shipping of expense tools and operating supplies that are used by employees outside the facilities: this case could be covered by the shipping of non-production materials on-consignment process but since it is suggested that process requires a finance controller approval, now it is not proper for this case – it takes time and the shipment reason is something that does not require a specific approval each time. Hence, it is proposed something that already is done in relation to the company laptops: each laptop has a specific bearer and there is an authenticated document that accompanies it that authorizes the employee to leave the plant with it. Thereby, in this case (see Appendix 3), there can be several boxes with the expense tools that are more commonly used in jobs outside the facilities and each box can be carried for a certain small list of

²⁴ Just in Time is a philosophy of operation based in three components: the right amount of goods, services and/or information; on-time delivery; quality – Swamidass, Paul M. 2000. Due to these elements, it is possible a manufacturing system perfectly runs with the minimum inventory necessary, and it shows why Volkswagen Autoeuropa does not have raw materials inventory.

collaborators (3 or 4, in order to include employees from both shifts). That allowance is authenticated in a document that should include the expense tools inside the box description (to the Security Gate verify if materials can leave the plant or not), the box ID (something that would have to be created) and the list of the box bearers. In addition, if it is necessary to carry operating supplies to do the repair job, an Area Production manager fill a document similar to the one used in the 4th mentioned process (Appendix J) but only to the main plant Security Gate sign the document. Through this process, besides the efficiency achieved by a non-bureaucratic process, it is possible to charge someone if some expense tool disappear and it is also possible to avoid a possible escape of operating supplies since the job request and its specificities are communicated to the Production Area – it means a specialist can assess which are the necessary materials to perform the service.

Risks: To these processes be efficient, it is necessary a certain strictness in the Security Gates of both plants, which can be more easily achieved if there are more tools of control, mainly in the small Volkswagen Autoeuropa plant. As a result, if that cannot be reached, there can be some resistance in run some processes such as the processes c) and d) from the small plant.

Key Performance Indicators (KPI's): As already mentioned, nowadays there is no KPI's, so the suggested indicators will cover all the processes and not just the To Be ones, even because they will approach not processes but activities, which can be common to several processes, as shown in Appendix 4.

The KPI objectives depend on the actual values of them on 24th October 2012 ²⁵ or, in case there is no data, the values seems to be reasonable but they should be revised after collecting data in the first time these indicators will be measured.

6. New processes implementation plan (Continuous Improvement Plan)

To implement the new processes and a new control method (the KPI's), there are several steps (in a cycle, not in a sequence) that should be followed. That cycle should reflect the PDCA cycle²⁶, being that the first step (Planning) is the essence of this work project, the second one (Do) is the Training and Execution, the third one (Check) is the Monitoring, in order to change things that revealed to be inefficient or unsuccessful in the Execution, and the 4th step (Act) is the definitive implementation, after the necessary changes. Whenever the processes seem to be less efficient than the expected or the KPI's are not adjusted, the cycle is repeated, until achieve a major effectiveness. In this way, the cycle is never finished, taking into account a Kaizen philosophy²⁷.

As concerns the PDCA cycle, the steps in further detail are:

- 1) Training: when something new is implemented, people that deal with it should be trained in order to perform the new activities in an effective way. Thus, in this case, the department that should have more training is the NPM Store, since its employees can sensitize all the others (all previous processes, excepting the circulation of operating supplies and some expense tools between the two Volkswagen Autoeuropa facilities, required the collaboration of these employees, so the next time a collaborator needs to ship a non-production

²⁵ See footnote 32, page 27.

²⁶ The PDCA cycle is a “four step approach for process improvement; (...) Plan – Recognize an opportunity and plan the change. (...) Do – Test the change. (...) Check – Review the test, analyze the results and identify learning. (...) Act – Take action based on what you learned in the check step.” – Hill, Arthur V. 2011a.

²⁷ Kaizen is a Japanese philosophy that means in a simplistic way “continuous improvement”, and its focus is the elimination of waste and inefficiencies in systems and processes – Hill, Arthur V. 2011b.

material he/she will go to the NPM Store) – they are change agents, and because of it, they need a reinforced support²⁸. Other department whose collaborators should receive training is the Security Gate since they will work with two new documents: the Request for Shipment (in the circulation of assets and/or some expense tools between the two Volkswagen Autoeuropa facilities) and the document that authorizes an employee to leave the plant with a certain tool box (in the shipping of non-production materials in order to perform repairing jobs outside the factory).

Besides, all departments involved in the new processes have to be informed about them, the KPI's and the associated penalties and rewards. This step (training and communication) should be performed in one month.

- 2) Execution: The processes should be implemented one to two weeks after the communication and the training about them, in order to everyone has the opportunity to clarify all doubts, and it should last one month.
- 3) Monitoring: This phase should take place immediately after the execution and its purpose is to assess the processes activities and flows, the difficulties that each intervener had, if the training was effective and enough, and if the KPI's objectives are realistic and reasonable²⁹. If the assessment result is negative and there are changes that need to be done, or it is necessary to do more training, the previous steps should be performed again (Plan, Do and Check).
- 4) Implementation: When the processes activities and flows, and the KPI's and their objectives seem to be the most effective and proper, there is the

²⁸ Burnes, Bernard (1996)

²⁹ Adapting the Gap Model of Service Quality to the processes analysis, the monitoring purpose is to seek potential process gaps (in operational structure/flow of activities), potential resources gaps and/or potential capability gaps (between the existing and the desired status). Therefore, instead of assessing the potential sources of customer dissatisfaction, it will evaluate the potential sources of the processes ineffectiveness – Kossmann, Mario. 2006.

implementation. In this phase is included the regular data collection about the KPI's objectives: the ones regarding the consignments should be considered in a weekly basis, since nowadays there already is a weekly report with the data for the KPI computation; the others will be monitored in a monthly basis.

Processes redesign: If KPI's objectives are continuously not achieved when they are considered reasonable and realistic, probably the problem is in the process itself. In that case, each activity and flow should be revised and there are a set of measures that can be taken concerning each KPI, as it is shown in Appendix 5.

Rewards and penalties: To achieve any objective, it is important there to be motivational measures, which can have a positive (rewards) or negative impact (penalties), depending on the result (better or worse than the "requested"). In this case, there will be just one KPI in which a failure in the objective will have a penalty: the % of consignments not delivered in the expected date of return, being the penalty not applied to the process interveners but to the materials keepers, since they are the major influencers to the KPI. In relation to the other KPIs, as the activities to which they refer to are not so substantial to the company, their results can make part of the criteria used to measure broader objectives, namely "Organization & Quality" and "Audit – Fails"³⁰.

7. Conclusions and Final Remarks

This theme, in the academic field, has not been explored so far, probably because shipping of non-production materials is not a core process or perhaps because in several

³⁰ In Volkswagen Autoeuropa, each collaborator can receive an objectives ward in the end of the year according to the achievement of goals for several criteria: "Cost reduction", "Audit – Fails", "Productivity", "Continuous Improvement" and "Organization & Quality", being some rated by employee, others by the all factory performance and the first one is rated by each produced car.

companies it is not faced as something problematic. Even so, I believe it is a general problem, transversal to different manufacturing industries.

In spite of there being work to exploit in this area, mainly by the company – trying, assessing and redefine (if necessary) the solutions I purposed, I believe the necessary insights to a fruitful change are here, with the safeguard that the major change depends a lot on the commitment by collaborators and organizational behavior, not only on the processes *per se*.

The benefits of this work project are the knowledge of the most updated non-production materials localization, the avoidance of losses and deviations (through circulation of non-production materials between the two facilities and shipping of non-production materials to perform repairing jobs outside Volkswagen Autoeuropa processes), the reduction of waste of time and, consequently, potential costs (through shipping of non-production materials to perform repairing jobs outside Volkswagen Autoeuropa process and the introduction of a KPI with focus in the reduction of waiting time by the transporter).

I believe this project is only a beginning, because the management, the monitoring and the redesign of processes is always incomplete in the long term. Now these can be the right processes, the right tools for the necessary improvement, but with the raising of awareness regarding the importance of the shipping processes and their effectiveness, we create a continuous improvement whose driving force is not a need but are the people.

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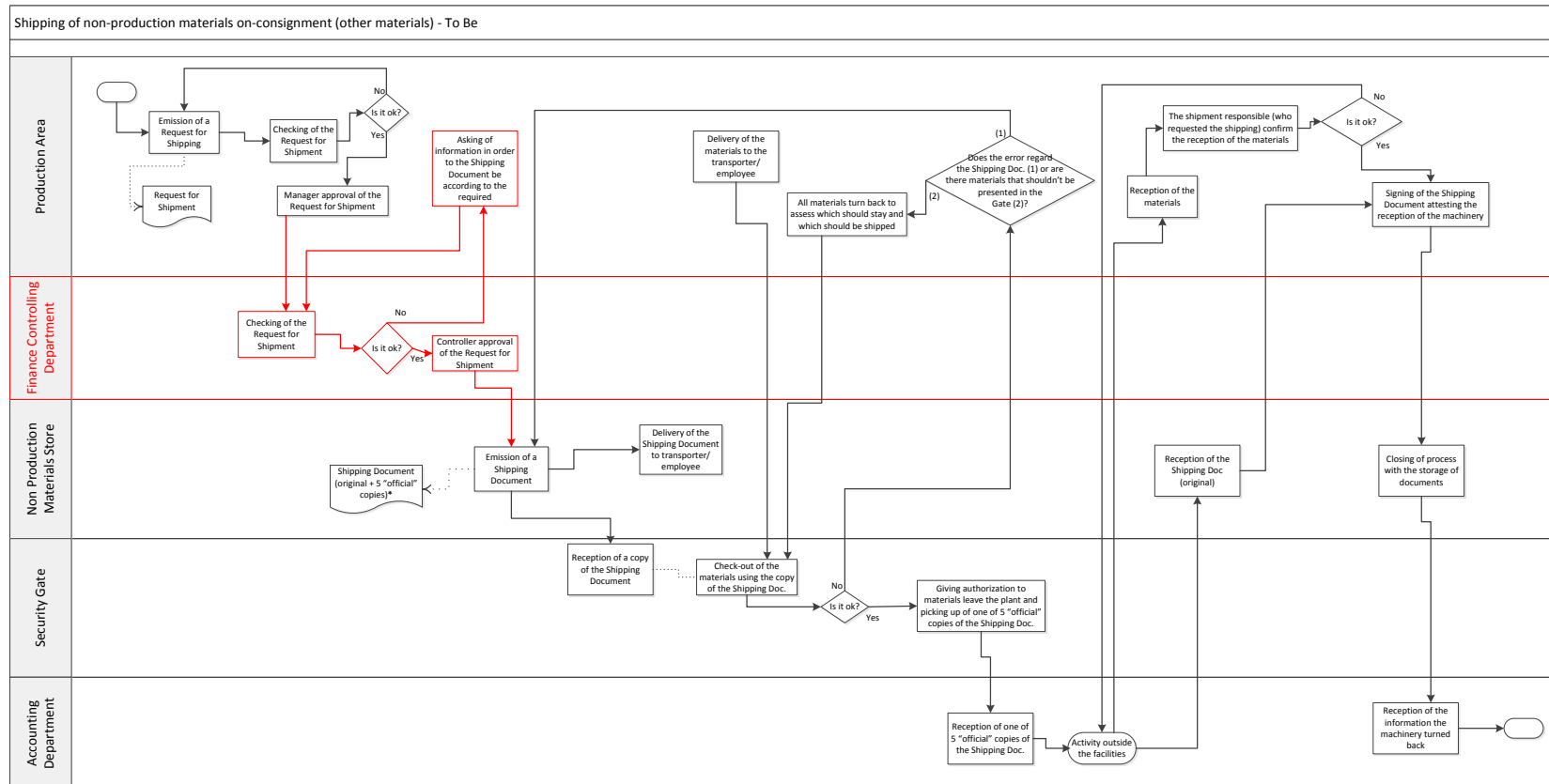
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9. Appendices

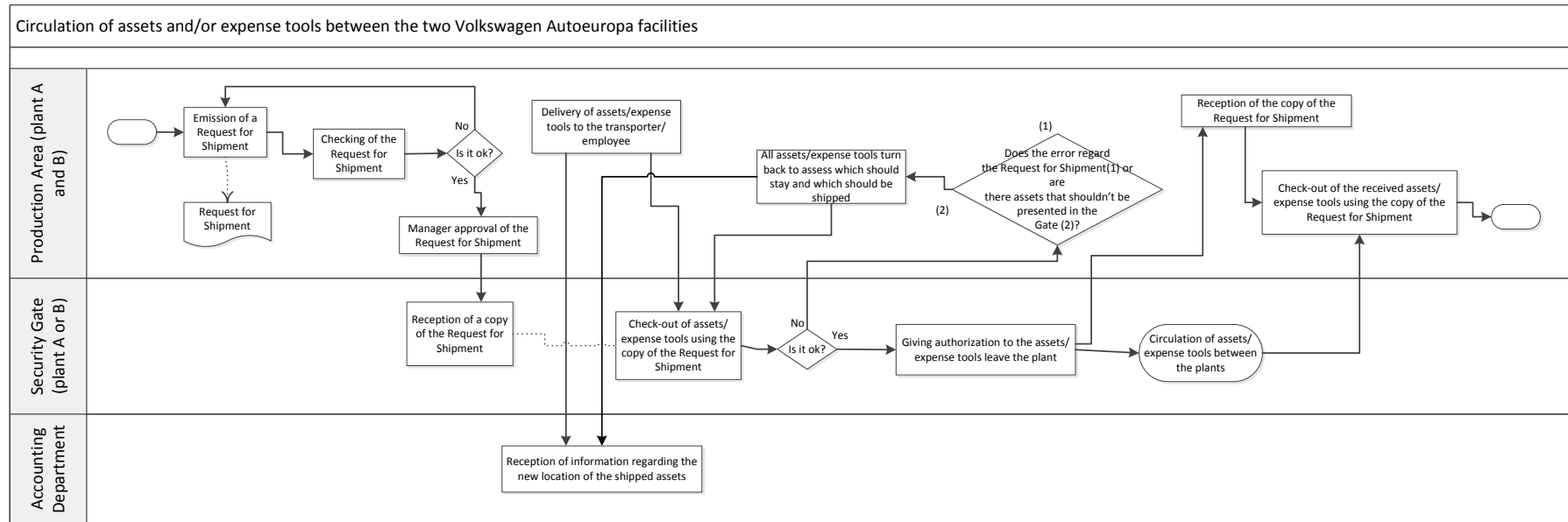
Appendix 1 – Shipping of non-production materials on-consignment (other materials) – To Be



Note: The activities and flows in red are the new ones in relation to the As Is process.

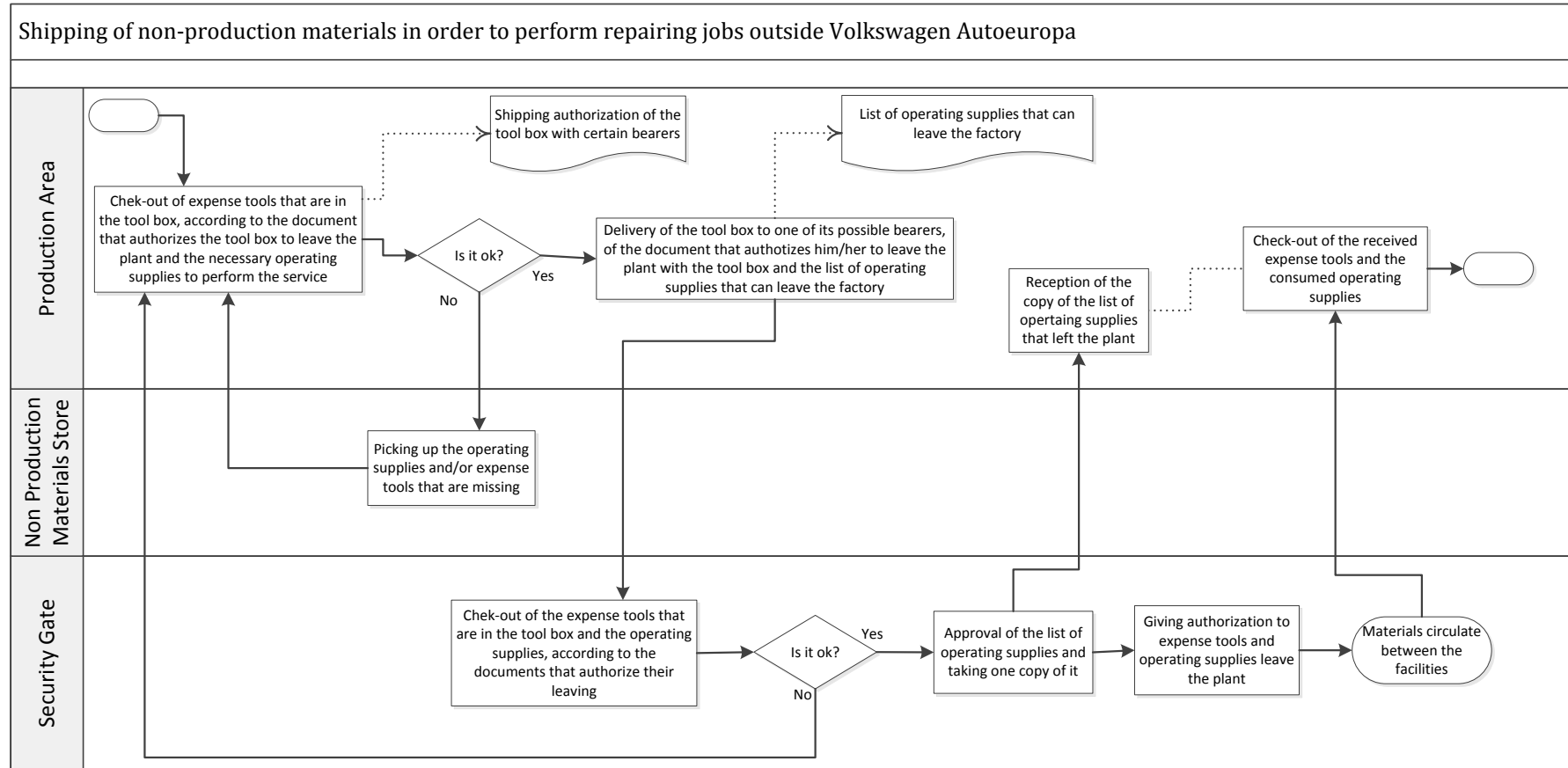
*Original/1: it follows the material; 2: it is “gleaned” in the main gate and it is delivered to Accounting Department; 6: it remains in the NPM Store; 3, 4 and 5: they can be used/delivered to the Police in case of scrutiny, to the transporter company and to the receiver.

Appendix 2 – Circulation of assets and/or expense tools between the two Volkswagen Autoeuropa facilities



Note: The Security Gate is in the plant from which the materials are shipped.

Appendix 3 – Shipping of non-production materials in order to perform repairing jobs outside Volkswagen Autoeuropa



Appendix 4 – KPI's for the non-production materials shipping processes

| Activity | KPI | Purpose | KPI Objective | Involved Processes³¹ |
|---|---|--|----------------------------|--|
| Approval of the Request for Shipment (by the Finance Controllers Office) | % of documents that fails the approval | It measures if the requested information is illuminating enough and if people who performed the previous activities understood the process so far | 2% of the documents/ month | 3, 5 |
| Reception of a copy of the Shipping Document (Security Gate) | % of times check-out of materials has to be postponed due to a missing of the copy of the Shipping Document | It measures the shipping delay caused by a lack of communication, lack of time or other between the NPM Store and the Security Gate | 5% of the shipments/ month | All except 6, 7, 8 |
| Reception of the machinery/other materials (after an activity outside the factory) | % of consignments not delivered in the expected date of return | It shows there are consignments that require special attention in its track, to assure they turn back | 15% ³² | 4, 5 |
| Check-out of materials using the copy of the Shipping Document/ the list of materials that can circulate between facilities/ the document that authorizes | % of times there is a fault between the presented materials to ship and the Shipping Document | It assesses if there are attempts to ship not authorized materials; however, in some cases, the problem can be in Shipping Documents that do not cover | 2% of the shipments/ month | All |

³¹ 1 – Shipping of non-production materials with debit (sale); 2 – Shipping of non-production materials with debit (devolutions); 3 – Shipping of non-production materials without debit; 4 – Shipping of non-production materials on consignment (repairs); 5 – Shipping of non-production materials on consignment (other materials – To Be); 6 – Circulation of some expense tools and operating supplies between plants (according to a list); 7 – Circulation of assets and/or expense tools between plants; 8 – Circulation of expense tools/operating supplies to perform jobs outside the factory

³² This value was based in the actual KPI value at 24/10/2012, whose value was 33%, so it seems plausible to reduce it to half of it.

| | | | | |
|--|--|--|--|--|
| the tool box to leave the plant with certain bearers/ the copy of the Request for Shipment | | all materials that are supposed to ship or is not well filled in | | |
|--|--|--|--|--|

Appendix 5 – Measures to take if KPI's objectives are not achieved

| KPI | Measures to take if KPI objective is not achieved |
|---|---|
| % of documents that fails the approval | <ul style="list-style-type: none"> - Is the document clear enough? If not, make it more clear; - Is all necessary information asked in the document? If not, change the document; - Raise awareness in the activity performers about the importance of this KPI and its purpose, in order to increase the efficiency in the process. |
| % of times check-out of materials has to be postponed due to a missing of the copy of the Shipping Document | <ul style="list-style-type: none"> - Try more efficient communication methods like email or fax, instead of a copy given at hand. |
| % of consignments not delivered in the expected date of return | <ul style="list-style-type: none"> - Implementation of a policy that allows the debit of the shipped materials value to the entity or person who keeps them more time than the expected by negligence or without a reasonable justification³³. |
| % of times there is a fault between the presented materials to ship and the Shipping Document | <ul style="list-style-type: none"> - Does the Shipping Document cover all the materials that should be shipped? Is it well filled in? If not, awareness should be raised in the responsible collaborators for that (NPM Store employee or Shipment requester) in order to they understand the impacts and additional costs of it |

³³ That is possible because, in case of a shipping on-consignment, in the Request for Shipment and in the Shipping Document, it is requested an estimation of the material value (it may be different from the book value).